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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte GREGORY EDWARD TIERNEY, STEPHEN R. VAN DOREN,
and SIMON C. STEELY JR.

_____

Appeal 2011-005622
Application 10/760,652[1]
Technology Center 2100

_____

Before LANCE LEONARD BARRY, JEAN R. HOMERE, AND JAY P.
LUCAS, *Administrative Patent Judges.*

LUCAS, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal from a final rejection of claims 1 to 34 under

authority of 35 U.S.C. § 134(a). Claim 35 has been indicated to be

allowable if amended to incorporate the subject matter of all independent

_____

[1] Application filed January 20, 2004. The real party in interest is Hewlett
Packard Development Co.

and intermediate claims. The Board of Patent Appeals and Interferences
(BPAI) has jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

Appellants' invention relates to a system and method for computers to
allow multiple processors to accurately retrieve data from the cache
memories of their own and other processors without having to read the data
from system memory. In the words of Appellants:

> Another embodiment of the present
> invention may comprise a multiprocessor network
> that includes a plurality of processor nodes in
> communication with each other. At least a first
> node of the plurality of processor nodes includes a
> copy of data associated with a given address that is
> also shared with memory. The first node operates
> in a first state that causes the first node to respond
> to a non-ownership request from a second node of
> the plurality of processor nodes for the data by (i)
> sending a response to the second node that
> includes a shared copy of the data, and (ii)
> transitioning from the first state to a second state
> indicating that the data is shared. The second node
> transitions to a third state in response to receiving
> the shared copy of the data from the first node,
> such that the second node becomes an ordering
> point in the network for providing a shared copy of
> the data.

> Yet another embodiment of the present
> invention may comprise a computer system that
> includes a plurality of processors comprising a
> source processor that issues broadcast request for
> desired data while in a first state and at least one

target processor having an associated cache that
includes a shared copy of the desired data. The at
least one target processor responds to the broadcast
request with a response indicating that the at least
one second processor includes the shared copy of
the desired data. Memory stores the desired data,
the memory responding to the broadcast request
with a response that includes a copy of the desired
data. The source processor transitions from the
first state to a second state in response to receiving
the responses from the memory and the at least one
target processor. The second state enables the first
processor to respond to requests from other of the
plurality of processors with a copy of the desired
data.

(Spec. 3, ¶ [0009], ¶ [0010]).

The following illustrates the claims on appeal:

Claim 1:

1.   A system comprising:

a first node operative to provide a source
broadcast requesting data, the first node
associating an F-state with a copy of the data in
response to receiving the copy of the data from
memory and receiving non-data responses from
other nodes in the system, the non-data responses
including an indication that at least a second node
includes a shared copy of the data, the F-state
enabling the first node to serve as an ordering
point in the system capable of responding to
requests from the other nodes in the system with a
shared copy of the data.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Arimilli	US 6,138,218	Oct. 24, 2000
Cypher	US 2004/0002992 A1	Jan. 01, 2004
Hum	US 2004/0123047 A1	Jun. 24, 2004
Hum	US 6,922,756 B2	Jul. 26, 2005
		(filed on Dec. 19, 2002)

REJECTIONS

The Examiner rejects the claims as follows:

R1:   Claims 1 to 6, 8, 9 and 13 stand rejected under 35 U.S.C. § 103(a) for being obvious over Cypher in view of Hum '756.

R2:   Claims 7 and 10 stand rejected under 35 U.S.C. § 103(a) for being obvious over Cypher in view of Hum '756 and further in view of Hum '047

R3:   Claims 11, 12, 14, 15, 17 to 21 and 23 to 34 stand rejected under 35 U.S.C. § 103(a) for being obvious over Cypher in view of Hum '756 and further in view of Arimilli.

R4:   Claims 16 and 22 stand rejected under 35 U.S.C. § 103(a) for being obvious over Cypher in view of Hum '756, Arimilli and further in view of Hum '047

We have only considered those arguments that Appellants actually raised in the Briefs. Arguments Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

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ISSUE

The pivotal issue before us is whether Appellants have shown that the Examiner erred in rejecting the claims under 35 U.S.C. § 103(a). The issue specifically turns on whether Cypher and Hum '756 teach the first node receiving and data and non-data responses as claimed.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Appellants have invented a method and system for multiprocessor computers that permit cache memories to more efficiently provide needed data to the processors from other cache memories than their own. (Spec. ¶¶ [0004], [0005]). To make sure that only non-stale data is provided to processors, protocols have been developed for sharing data among cache memories that label the data's status. (¶ [0021]). The F-state label, "First among equals" indicates that the data in the cache line is valid and has not yet been modified by a processor. (Table 1).

2. The Cypher and Hum '756 references teach cache protocols for multiprocessor systems.

PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a

rejection [under § 103] by showing insufficient evidence of prima facie obviousness or by rebutting the prima facie case with evidence of secondary indicia of nonobviousness.") (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)).

"In reviewing the [E]xaminer's decision on appeal, the Board must necessarily weigh all of the evidence and argument." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

References within the statutory terms of 35 U.S.C. § 103 qualify as prior art for an obviousness determination only when analogous to the claimed invention. *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992). Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986); *see also In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979) and *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).). Furthermore, "'there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness' . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

"This court has held in a number of decisions that a United States patent speaks for all it discloses as of its filing date, even when used in

combination with other references." *In re Zenitz*, 333 F.2d 924, 926 (CCPA, 1964) (internal citations omitted).

ANALYSIS

Arguments with respect to the rejection
of claims 1 to 13
under 35 U.S.C. § 103(a) [R1-R3]

The Examiner has rejected the noted claims for being obvious over Cypher and Hum '756, either alone (R1) or in combination with Hum '047 or Arimilli (R2-R3).

The Appellants demur, contending: "Cypher does not in any way disclose---or even contemplate---a first node that provides a source broadcast for data and then associates an F-state (or any other state) with a copy of the data *in response to* receiving the copy from memory *and* receiving non-data responses from other nodes, as required by claim 1." (App. Br. 12, middle). Appellants further observe:

> Hum does not disclose that its F-state is associated with a copy of the data in response to receiving the copy of the data from memory and receiving non-data responses from other nodes in the system. Accordingly, even if the teachings of Cypher could be modified with the teachings of Hum, limitations required by claim 1 would be missing from the proposed combination.

(App. Br. 12, just below middle; emphasis omitted).

We have considered each of the cited references carefully, and we agree with the Appellants. The claim requires that the first node receives a copy of the data from memory *and* receive non-data responses from other

nodes in the system, those non-data responses indicating that a second node has a shared copy of the data. (*See* claim 1, reproduced above.) The Examiner relies upon Cypher for the teaching of the non-data responses, namely paragraphs 7, 8 and 68. (Ans. 4, top). Those paragraphs in Cypher address a network as depicted in Figure 8A reproduced below:
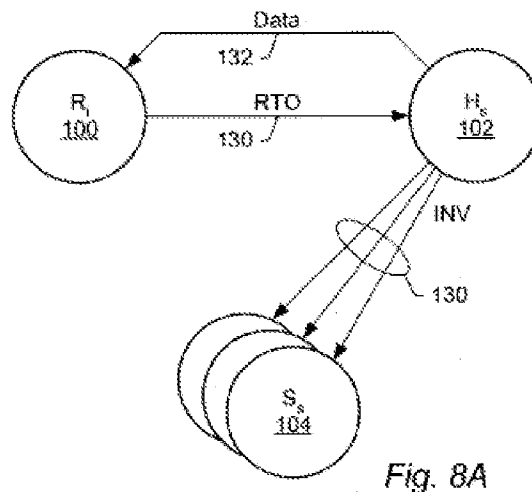

Fig. 8A

Figure 8A represents the network discussed in Cypher, ¶¶ [0067] and [0068].

Though the Examiner is correct in stating that a second node 102 contains a shared copy of the data, the response 132 that flows to the first node 100 is a data response. (¶ [0068], 1. 11). Node 100 does not receive a non-data response as required by the claim. The Examiner points to non-data responses received by Cypher's home client 102 in satisfaction of this limitation. (Ans. 19, bottom). However the home client is not equivalent to the claimed "first node", being more akin to the second node mentioned in the claim. (Cypher, ¶ [0068]). The Examiner does mention that the Hum '756 reference teaches the F state, a "first among equals" state, which can be read on the claimed F state. (Ans. 20, bottom; Hum col. 5, 1. 66). However, there is no teaching in Hum '756 that cures the deficiency of Cypher

concerning a non-data response coming to the first node. We conclude that the Appellants have shown an error in the rejection R1, affecting claim 1 and all claims dependent thereon.

Claims 7 and 10, which were rejected under rejection R2 under the same rationale as claim 1 concerning Cypher and Hum '756, are dependent on claim 1 and thus subject to the same error as expressed above. Hum '047, a reference added by the Examiner in rejection R2, does not cure the deficiencies of the primary references.

Claims 11 and 12, which were rejected under Rejection R3, uses the same rationale for the elements of the independent claim 1 as discussed above and thus subject to the same error. Arimilli is not shown to cure the deficiencies of the primary references.

*Arguments with respect to the rejection
of claims 14 to 34
under 35 U.S.C. § 103(a) [R3-R4]*

The Examiner has rejected the noted claims for being obvious over Cypher and Hum '756 with either Arimilli (R3) or Arimilli in combination with Hum '047 (R4).

Claim 14 and dependent claims 15 and 17 to 19 were rejected for being obvious over Cypher in view of Hum '756 and further in view of Arimilli. The Examiner explains the rejection with respect to the moving of the ordering point. (Ans. 30, bottom). We supplement that reasoning with the following observation. In Cypher, Figure 8A, home client 102 can be read on the first node. In response to a read request 130, the data that the

first node shares with slave agents 104 is sent in a response 132 to a second node 100. (Cypher, ¶ [0068], l. 13). [Though Cypher teaches an ownership request 130, the use of a non-ownership request is an obvious modification.] The second node 102 stays in a "shared" state. Node 100, on receiving the data, becomes an ordering point for it, as claimed.

The rejection of claims 15 and 17 to 19 follows the same logic, as supplemented by the Examiner. (Ans. 9, 10). No error is found in this rejection.

The rejection of claim 16 under rejection R4 is based on the reasoning of the Examiner. (Ans. 12, middle). We supplement this teaching with that of Cypher, in which the state information for slave agents 104 is rendered invalid in transforming to the second state. (Cypher, ¶ [0068], near the end).

The rejections of claims 20, 26 and 30 (R3) is based on an application of the Cypher reference Fig. 8A (shown above) in which a first processor 100 issues a request for data to a target processor 102 with shared access to that data. The data is provided to the first processor 100. This reference is supplemented by that of Hum '756, col. 5, bottom, which teaches that in a node in an F state the broadcast request is answered by the copy of the data in system memory. (Ans. 31 to 46). When provided by this data, the first node can become a source of the data to other processors, as claimed.

Appellants argue that the individual references do not contain the totality of the limitations. (App Br. 18, 19). The claims have been rejected on the combination of references, however, and we find the combined teachings render obvious the rejected claims. *See In re Keller*, 642 F.2d 413 (CCPA 1981). Appellants argue that the references are improperly combined. (App. Br. 12, middle). The references all teach methods of

maintaining coherency in multiprocessor systems, analogous to each other and to the application. *See In re Clay,* cited above.

CONCLUSIONS OF LAW

Based on the findings of facts and analysis above, we conclude that Appellants have not shown that the Examiner erred in rejecting claims 14 to 34 under rejections R3 and R4 respectively. However, we conclude that the Appellants have shown error in the rejections R1 and R2 of claims 1 to 10 and 13 and in the rejection R3 of claims 11 and 12.

DECISION

We reverse the Examiner's rejection R1 and R2 of claims 1 to 10 and 13 and rejection R3 of claims 11 and 12. We affirm the Examiner's rejections R3 and R4 of claims 14 to 34.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

<u>AFFIRMED-IN-PART</u>

peb